REJ10J1783-0110

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SH7147 Group Debugging MCU Board

HS7147EDB01H User's Manual

Renesas Microcomputer Development Environment System

SuperH™ Family / SH7147 Series

HS7147EDB01HE

User's Manual

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Renesas Technology
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READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

Emulator Product:

Throughout this document, the term "emulator product" shall be defined as the following products produced only by Renesas Technology Corp. and Renesas Solutions Corp. excluding all subsidiary products.

- E10A-USB emulator main unit
- Debugging MCU board

The user system or a host computer is not included in this definition.

Purpose of the Debugging MCU Board:

This debugging MCU board is used to connect the E10A-USB emulator to the user system. This debugging MCU board must only be used for the above purpose.

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It is highly recommended that first-time users be instructed by users that are well versed in the operation of the emulator product.

Users are required to be familiar with the basic knowledge for the electric circuits, logic circuits, and microcomputers.

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Figures:

Some figures in this user's manual may show items different from your actual system.

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READ FIRST

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Do not attempt to use the emulator product until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

Either in the user's manual or on the product, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties. Their graphic images and meanings are given in this safety page. Be sure to read this chapter before using the product.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

In addition to the four above, the following are also used as appropriate.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**

User Registration

When you have purchased the emulator represented in this user's manual, be sure to register it. As the H/W Tool Customer Registration Sheet is included with this product, fill it in and send the same contents to the following address by an email. Your registered information is used for only after-sale services, and not for any other purposes. Without user registration, you will not be able to receive maintenance services such as a notification of field changes or trouble information. So be sure to carry out the user registration.

For more information about user registration, send an email to the following address.

regist_tool@renesas.com

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Section 1 Product Overview

1.1 Introduction

The High-performance Embedded Workshop is a graphical user interface intended to ease the development and debugging of applications written in C/C++ programming language and assembly language for Renesas microcomputers. Its aim is to provide a powerful yet intuitive way of accessing, measuring, and modifying the debugging platform in which the application is running.

This system is a software and hardware development support tool for application systems using the Renesas original microcomputer.

The debugging MCU board is connected to the user system through the IC socket on the user system. The user system can be debugged under the conditions similar to the actual application conditions. The debugging MCU board enables debugging anywhere indoors or out with the E10A-USB emulator. The host computer for controlling the debugging MCU board must be an IBM PC compatible machine with USB 1.1/2.0 (Full-Speed).

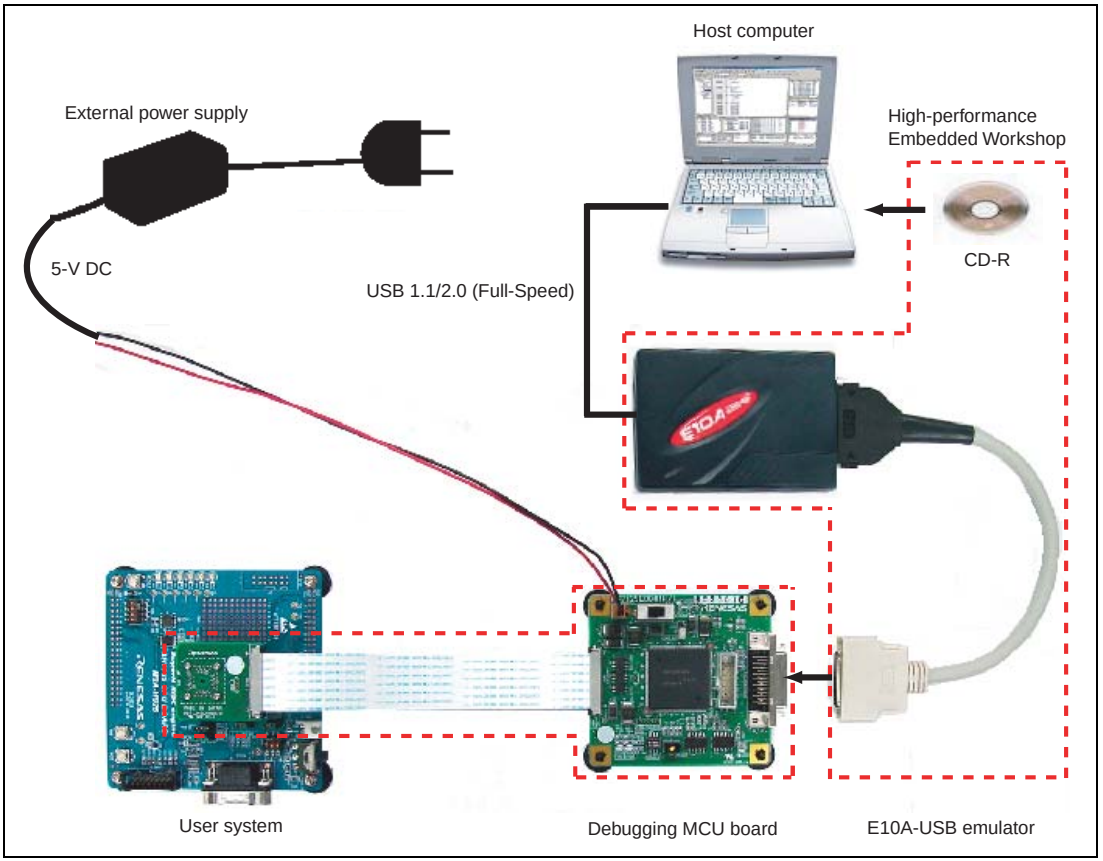


Figure 1.1 System Configuration with the Debugging MCU Board

The debugging MCU board provides the following features:

- Excellent cost-performance in-circuit emulator

  Using the debugging MCU board with the E10A-USB emulator implements low-cost debugging of the user system without the user pins being occupied by the debugging interface (H-UDI).

  When the AUD function on the debugging MCU board is used, the debugging MCU board supports the window trace function for trace acquisition of a large-capacity realtime trace or a memory access (memory access address or memory access data) within the specified ranges.
- Realtime emulation

  Realtime emulation of the user system is enabled at the maximum operating frequency of the CPU.
- Excellent operability

  Using the High-performance Embedded Workshop on the Microsoft®, Microsoft® Windows® 2000, and Microsoft® Windows® XP operating systems enables user program debugging using a pointing device such as a mouse. The High-performance Embedded Workshop enables high-speed downloading of load module files.
- Debugging of the user system in the final development stage

  The user system can be debugged under conditions similar to the actual application conditions.
- Compact debugging environment

  When the emulator is used, a laptop computer can be used as a host computer, creating a debugging environment in any place.

⚠ CAUTION

READ the following warnings before using the debugging MCU board. Incorrect operation will damage the user system and the debugging MCU board. The USER PROGRAM will be LOST.

1. Check all components against the component list after unpacking the emulator.
2. Never place heavy objects on the casing.
3. Protect the emulator from excessive impacts and stresses. For details, refer to section 1.5, Environmental Conditions.
4. Only supply the power of the specified voltages or power-supply frequencies to the debugging MCU board.
5. When moving the host computer or user system, take care not to vibrate or damage it.
6 After connecting the cable, check that it is connected correctly. For details, refer to section 2, Setting Up the Debugging MCU Board.
7. Supply power to the connected equipment after connecting all cables. Cables must not be connected or removed while the power is on.

1.2 Components

After removing the product from its packaging, confirm that you have all of the components. For details on the components of the debugging MCU board, refer to section 1.3, Components in the Package for the Debugging MCU Board. If any component is not present, contact your nearest Renesas sales office.

1.3 Components in the Package for the Debugging MCU Board

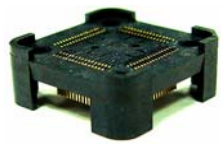
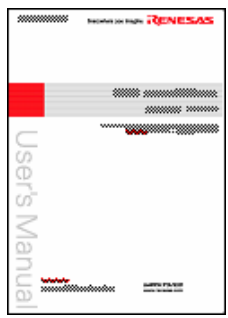
The debugging MCU board supports the SH7147 group (SH7142/SH7147). Table 1.1 lists the components supplied in the package for the debugging MCU board.

In the product as shipped, the main unit of the debugging MCU board is connected to the user system interface board with the flexible flat cable (FFC). Do not detach them from each other.

Table 1.1 Components in the Package for the Debugging MCU Board

Classi-fication	Component	Appearance	Qty	Remarks
Hard-ware	Debugging MCU board main unit		1	Depth: 80.0 mm, width: 85.0 mm, height: 22.3 mm, mass: 56.0 g * The main unit of the debugging MCU board is connected to the user system interface board with the FFC cable. Do not disconnect these components.
	FFC cables		2	Length: 150.0 mm, mass: 1.4 g
	User system interface board		1	Depth: 35.0 mm, width: 40.0 mm, height: 10.3 mm, mass: 9.5 g
	Power cable		1	Length: 0.5 m
	IC socket		1	Connect the IC socket to the user system.

Table 1.1 Components in the Package for the Debugging MCU Board (cont.)

Classi-fication	Component	Appearance	Qty	Remarks
Hard-ware (cont.)	Socket cover		1	For installing the MCU
	Screws (M2.0 x 10 mm)		4	For fastening the user system interface board
	Screws (M2.0 x 6 mm)		4	For fastening the socket cover
	Guide pins		3	
	Screwdriver		1	
	User's manual		1	SH7147 Group Debugging MCU Board User's Manual (this manual)

CAUTION

Use the following IC sockets and socket covers on the user sytem.

- **For SH7147 (package code: PLQP0100KB-A; former code: FP-100UV):**
  IC socket: NQPACK100SD-ND (manufactured by Tokyo Eletech Corporation)
  IC socket cover: HQPACK100SD (manufactured by Tokyo Eletech Corporation)

1.4 Hardware Configuration

As shown in figure 1.2, the usable configuration of the debugging MCU board consists of the main unit, FFC cable, user system interface board, and power cable. The debugging MCU board is connected, via the E10A-USB emulator, to the host computer over a USB 1.1/2.0 (Full-Speed) link.

The host computer, E10A-USB emulator, and external power supply must be separately obtained by the user.

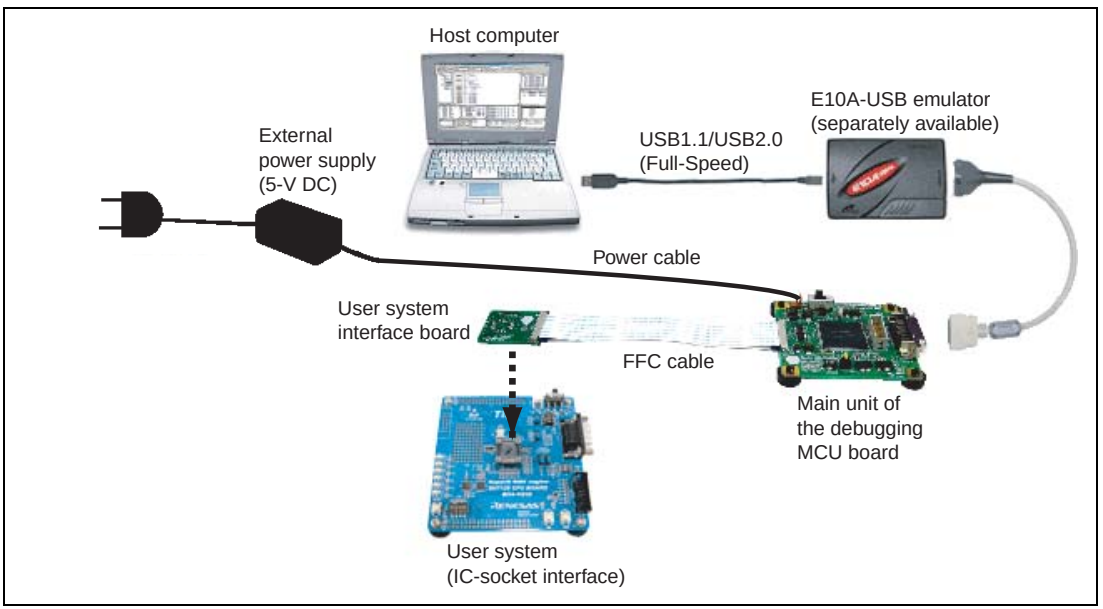


Figure 1.2 Hardware Configuration of the Debugging MCU Board

1.4.1 Configuration of the Main Unit of the Debugging MCU Board

The names of each section of the debugging MCU board are explained below.

Top of the Main Unit of the Debugging MCU Board (1)

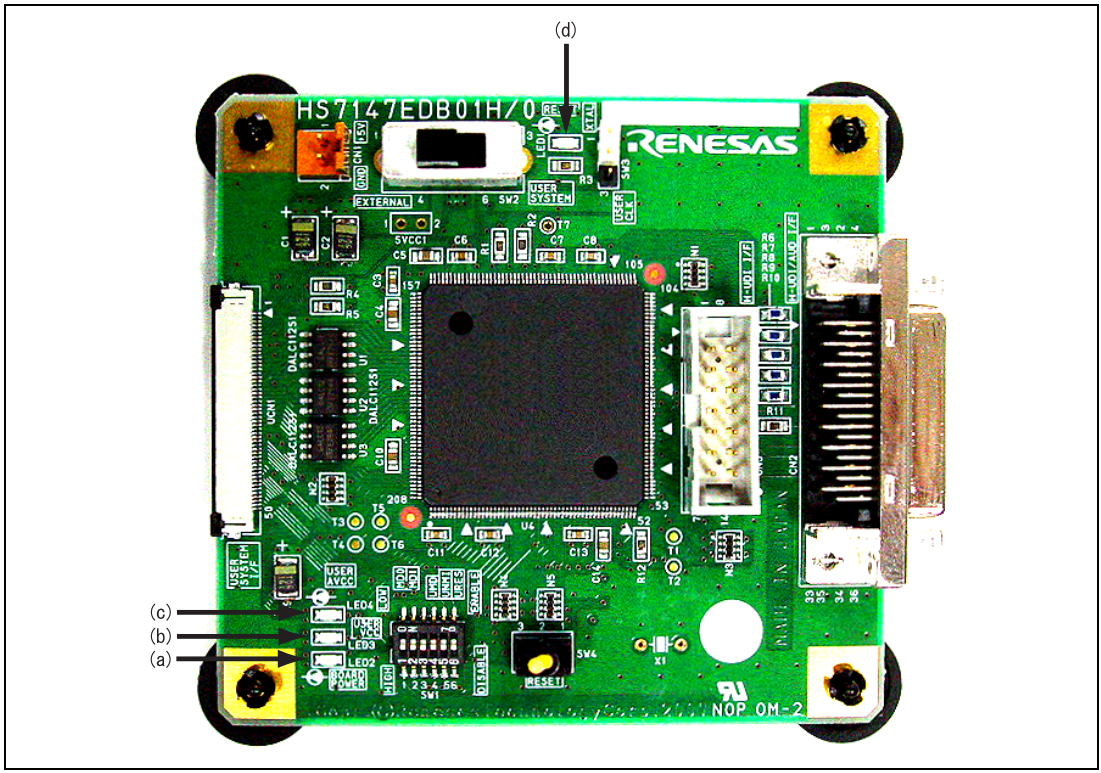


Figure 1.3 Top of the Main Unit of the Debugging MCU Board (1)

(a) External power LED: Marked ‘BOARD POWER’. This LED is lit while external power is being supplied from the power cable or from the user system to the PVCC pin of the MCU.The source of the power supply is determined by the setting of the power-selection switch.

(b) User VCC LED: Marked ‘USER VCC’. This LED is lit while power is being supplied from the user system to the VCC pin of the MCU.

(c) User AVCC LED: Marked ‘USER AVCC’. This LED is lit while power is being supplied from the user system to the AVCC pin of the MCU.

(d) Reset LED: Marked ‘RST’. This LED is lit while the reset signal is being input to the MCU.

Top of the Main Unit of the Debugging MCU Board (2)

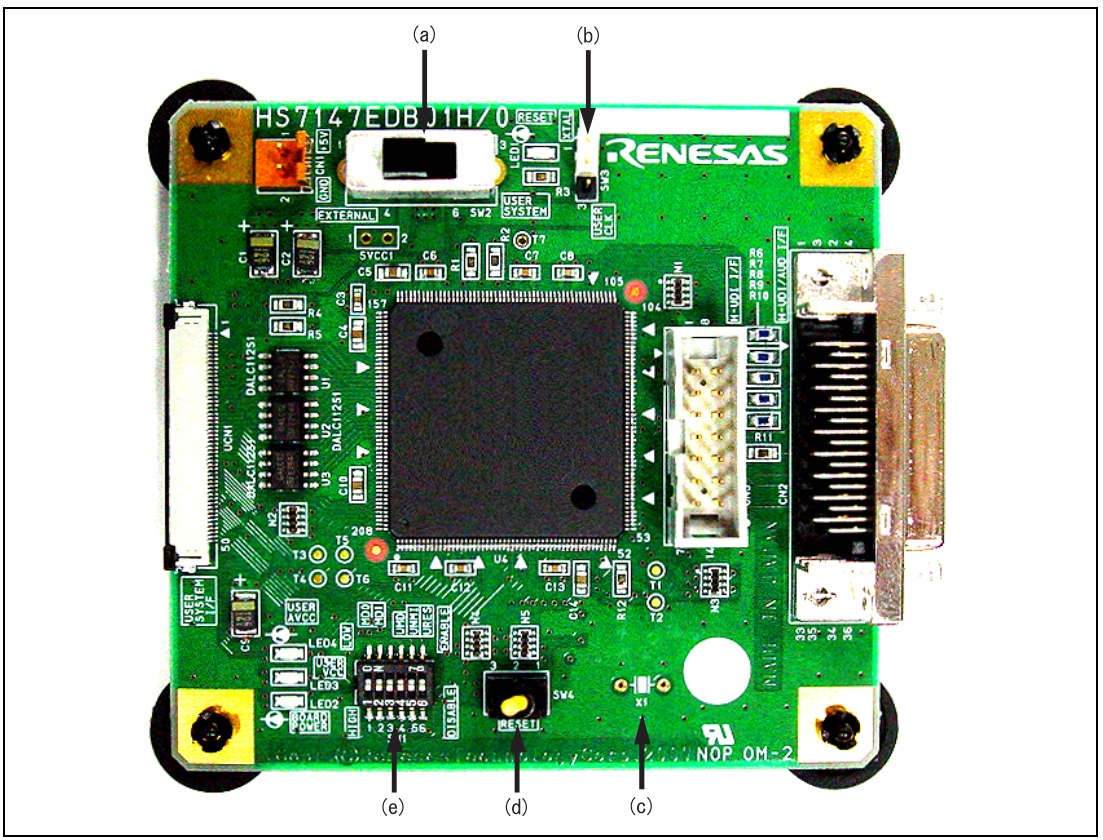


Figure 1.4 Top of the Main Unit of the Debugging MCU Board (2)

(a) Power-selection switch:	This switch is used to select the power source for the debugging MCU board. When 'EXTERNAL' is selected, an external power supply is the source for the debugging MCU board. When 'USER SYSTEM' is selected, the PVCC power supply on the user system is the source for the debugging MCU board.
(b) Clock-selection jumper:	This jumper is used to select the clock signal for input to the MCU on the debugging MCU board. When 'XTAL' is selected, the input clock signal is from the crystal resonator on the debugging MCU board. When 'USER CLK' is selected, the input clock signal is from the EXTAL pin on the user system. Note: A crystal resonator on the user system is not supported.
(c) Crystal-resonator installation sockets:	The crystal resonator for supplying the external clock signal is mounted here when 'XTAL' has been selected on the clock-selection jumper.
(d) Reset switch:	This switch is used to input reset signals manually to the debugging MCU board.
(e) User-system input signal enabling/disabling switches:	These switches are used to enable or disable the input of /RES and NMI signals from the user system and connect or disconnect the user system. When the MD signal from the user system has been disabled, this switch also sets input of the MD signal to the MCU board.

Top of the Main Unit of the Debugging MCU Board (3)

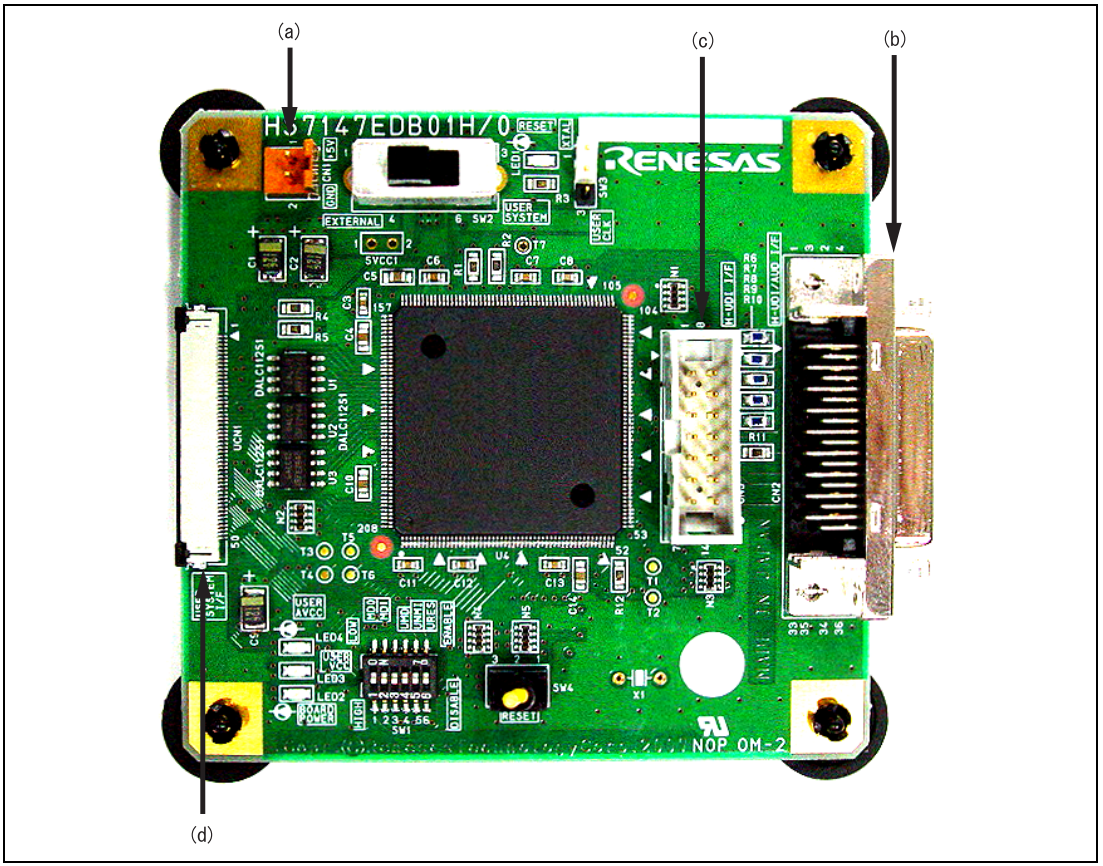


Figure 1.5 Top of the Main Unit of the Debugging MCU Board (3)

(a) Power-cable connector:	This connector is used to connect the debugging MCU board to the power cable for the external power supply.
(b) H-UDI interface connector (36 pins):	This connector is used to connect the debugging MCU board to the 36-pin cable of the E10A-USB emulator.
(c) H-UDI interface connector (14 pins):	This connector is used to connect the debugging MCU board to the 14-pin cable of the E10A-USB emulator.
(d) User system interface connector 1:	This connector is used to connect the main unit of the debugging MCU board to the FFC cable. Note: The FFC cable already occupies this connector in the product as shipped. Do not remove the cable from the connector.

Bottom of the Main Unit of the Debugging MCU Board

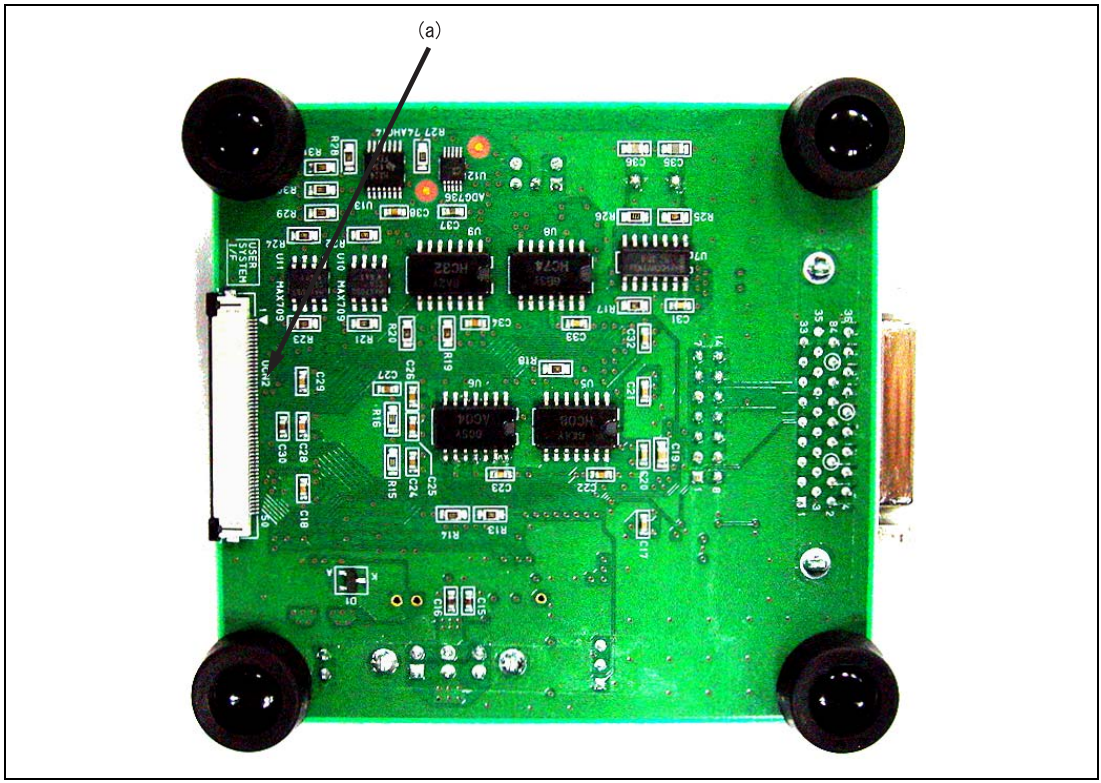


Figure 1.6 Bottom of the Main Unit of the Debugging MCU Board

(a) User system interface connector 2: This connector is used to connect the main unit of the debugging MCU board to the FFC cable.

Note: The FFC cable already occupies this connector in the product as shipped. Do not remove the cable from the connector.

1.4.2 Configuration of the User System Interface Board

The names of each section of the user system interface board are explained below.

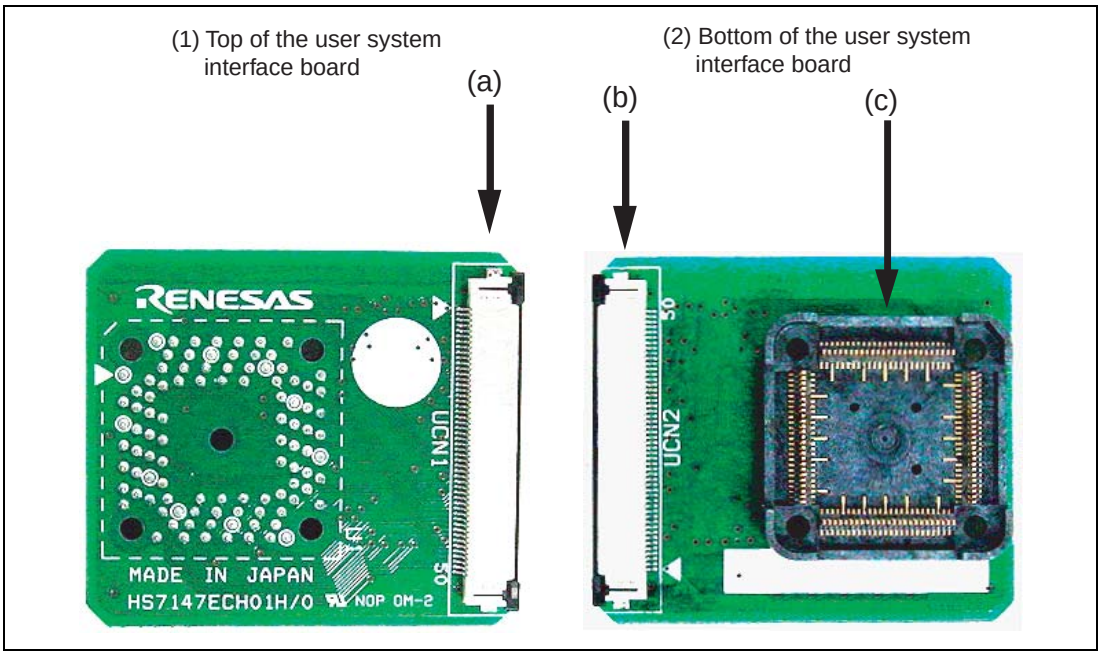


Figure 1.7 User System Interface Board

(a) User system interface connector 1:	This connector is used to connect the user system interface board to the FFC cable. Note: The FFC cable already occupies this connector in the product as shipped. Do not remove the cable from the connector.
(b) User system interface connector 2:	This connector is used to connect the user system interface board to the FFC cable. Note: The FFC cable already occupies this connector in the product as shipped. Do not remove the cable from the connector.
(c) User system connector:	This connector is for connection to the user system.

1.5 Environmental Conditions

⚠ CAUTION

Observe the conditions listed in tables 1.6 and 1.7 when using the debugging MCU board. Failure to do so can lead to abnormal operation of the user system, the debugging MCU board, and the user program.

Table 1.6 Environmental Conditions

Item	Specifications
Temperature	Operating: +10°C to +35°C Storage: –10°C to +50°C
Humidity	Operating: 35% RH to 80% RH, no condensation Storage: 35% RH to 80% RH, no condensation
Vibration	Operating: 2.45 m/s^2 max. Storage: 4.9 m/s^2 max. Transportation: 14.7 m/s^2 max.
Ambient gases	No corrosive gases may be present

Table 1.7 Operating Environment

Item	Description
Host computer	IBM PC or compatible machine that satisfies the operating-environment conditions of the E10A-USB emulator
Emulator	Renesas microcomputer development tool: E10A-USB emulator (HS0005KCU01H or HS0005KCU02H)
Power supply	DC 5 V ± 10%
Supply current	500 mA (max.)

Section 2 Setting Up the Debugging MCU Board

2.1 Flow Chart before Using the Debugging MCU Board

Unpack the debugging MCU board and prepare it for use as follows:

⚠ WARNING

READ the reference sections shaded in figure 2.1 before using the debugging MCU board. Incorrect operation will damage the user system and the debugging MCU board uct. The USER PROGRAM will be LOST.

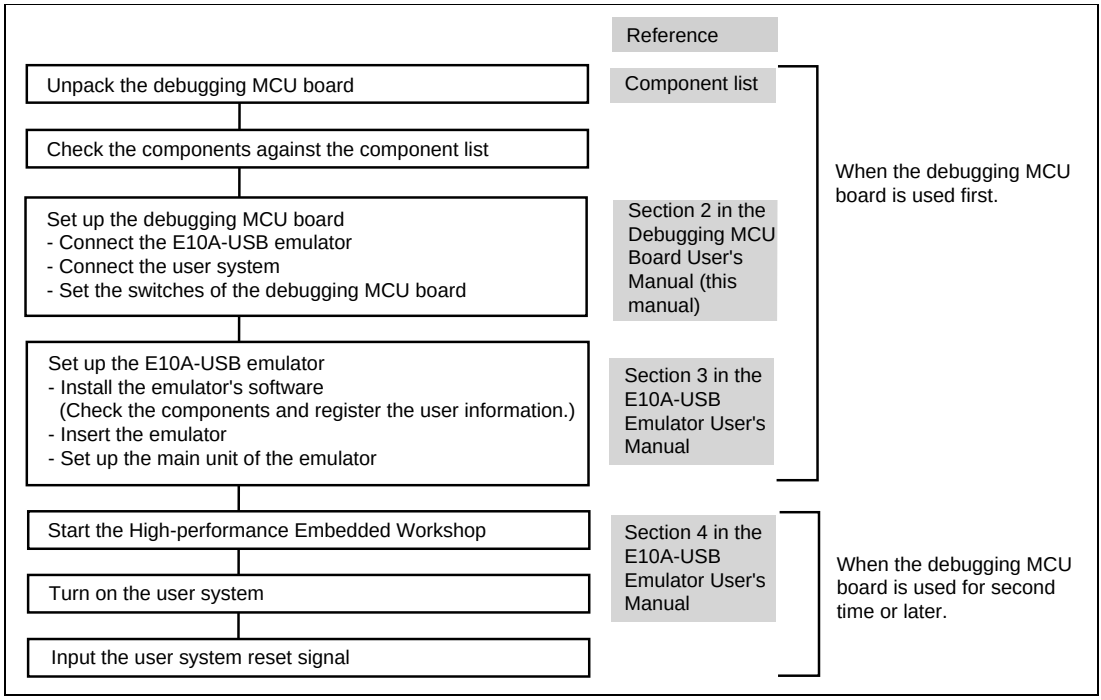

Reference
Unpack the debugging MCU board
Component list
Check the components against the component list
When the debugging MCU board is used first.
Set up the debugging MCU board
- Connect the E10A-USB emulator
- Connect the user system
- Set the switches of the debugging MCU board
Section 2 in the Debugging MCU Board User's Manual (this manual)
Set up the E10A-USB emulator
- Install the emulator's software
(Check the components and register the user information.)
- Insert the emulator
- Set up the main unit of the emulator
Section 3 in the E10A-USB Emulator User's Manual
Start the High-performance Embedded Workshop
Section 4 in the E10A-USB Emulator User's Manual
When the debugging MCU board is used for second time or later.
Turn on the user system
Input the user system reset signal

Figure 2.1 Preparation Flow Chart for the Debugging MCU Board

2.2 Setting Up the Debugging MCU Board

To apply the debugging MCU board, you must obtain an E10A-USB emulator. This section describes how to connect the debugging MCU board, the E10A-USB emulator, and the user system interface board.

Before making the connections, check that the host computer is turned off, the E10A-USB emulator is not connected to the host computer via the USB cable, and power is being supplied to neither the debugging MCU board nor the user system.

2.2.1 Connecting the Debugging MCU Board to the E10A-USB Emulator

Follow the below procedure to connect the debugging MCU board to the E10A-USB emulator.

1. Connect the user system interface cable (14 or 36 pins) provided with the E10A-USB emulator to the side connector of the E10A-USB emulator as shown in figure 2.2.

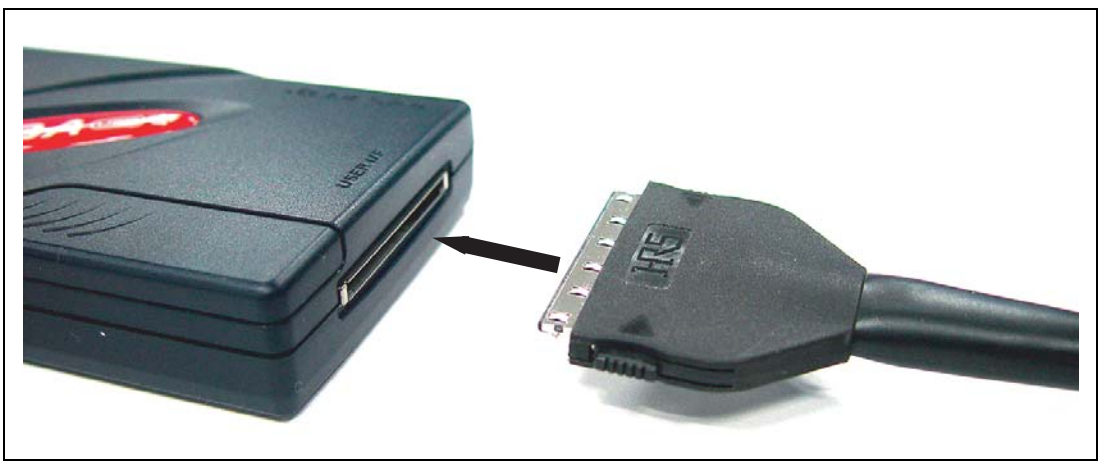


Figure 2.2 Connecting the E10A-USB Emulator to the User System Interface Cable

2. Connect the 14-pin or 36-pin connector of the user system interface cable to the H-UDI interface connector on the debugging MCU board as shown in figures 2.3 and 2.4. Connect the 36-pin or 14-pin connector to CN2 or CN3, respectively.

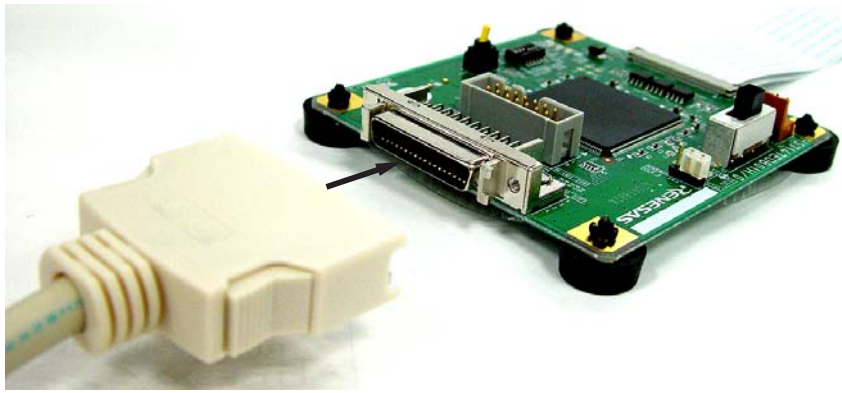


Figure 2.3 Connecting the User System Interface Cable (36 Pins) to the Debugging MCU Board

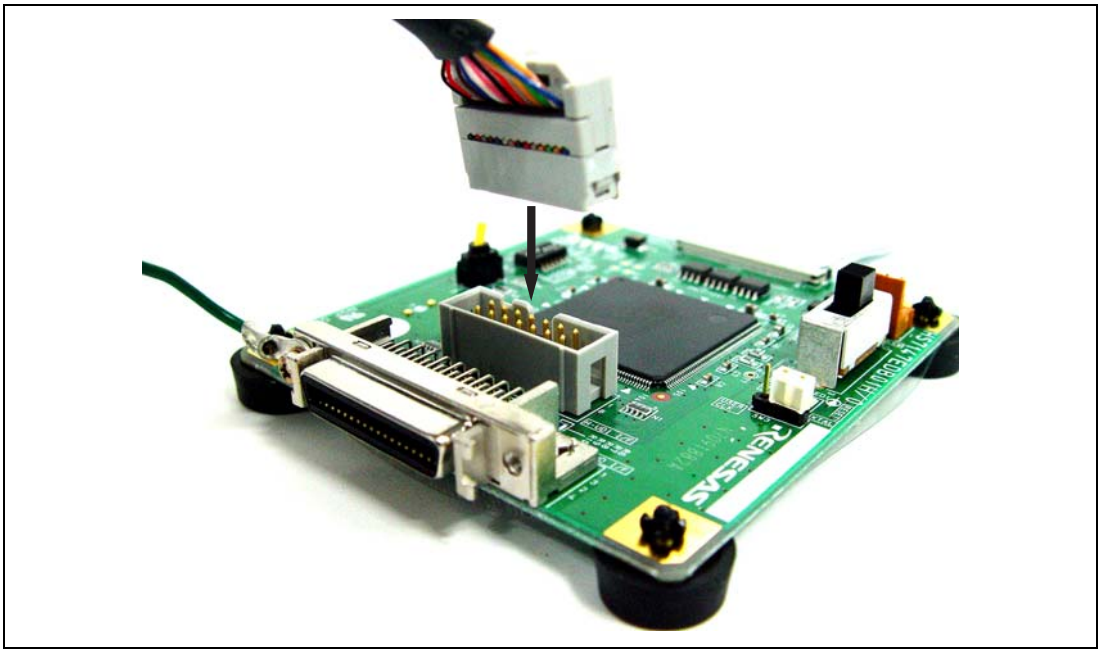


Figure 2.4 Connecting the User System Interface Cable (14 Pins) to the Debugging MCU Board

2.2.2 Connecting the Debugging MCU Board to the User System

To connect the debugging MCU board to the user system, follow the instructions below.

⚠ WARNING

Always switch OFF the emulator product, the debugging MCU board, and the user system before any connection or removal of the USER SYSTEM INTERFACE BOARD. Furthermore, make sure that the pin 1 positions on both sides are correctly aligned. Failure to do so will create a FIRE HAZARD that can damage the emulator product, the debugging MCU board, the user system interface board, or the user system, or produce PERSONAL INJURY.

1. Solder the IC socket to the user system.

CAUTION

Before applying solder, use epoxy resin adhesive to affix the guide points on the IC socket to the user system.

Ensure full wetting of the leads so that the solder flows over the leads and forms good fillets (use slightly more solder than you normally would).

2. Align pin 1 on the IC socket on the user system with pin 1 on the user system interface board, and plug the user system connector of the interface board into the IC socket on the user system, as is shown in figure 2.5.

CAUTION

Ensure that the locations of pin 1 on the socket and connector are aligned before inserting the connector.

CAUTION

1. **Use a Philips-head screwdriver with a head-size matching that of the screw.**
2. **The tightening torque must be no greater than 0.054 N•m. If the applied torque cannot be accurately measured, stop tightening the screw when the force required for further tightening suddenly becomes significantly greater than was initially required. Excessive tightening may break the screw head or crack the IC-socket solder, leading to an IC contact error.**
3. **If the emulator does not operate correctly, cracks may have been produced in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

3. Fasten the user system interface board to the IC socket on the user system with the four screws (M2.0 x 10 mm) provided. Tighten each of the screws a little at a time, alternating between those on opposing corners. Do not concentrate on fully tightening one screw at a time. Take special care, such as manually securing the IC-socket soldered area, to prevent damage to the soldered IC socket due to excessive tightening of the screws or twisting of components.

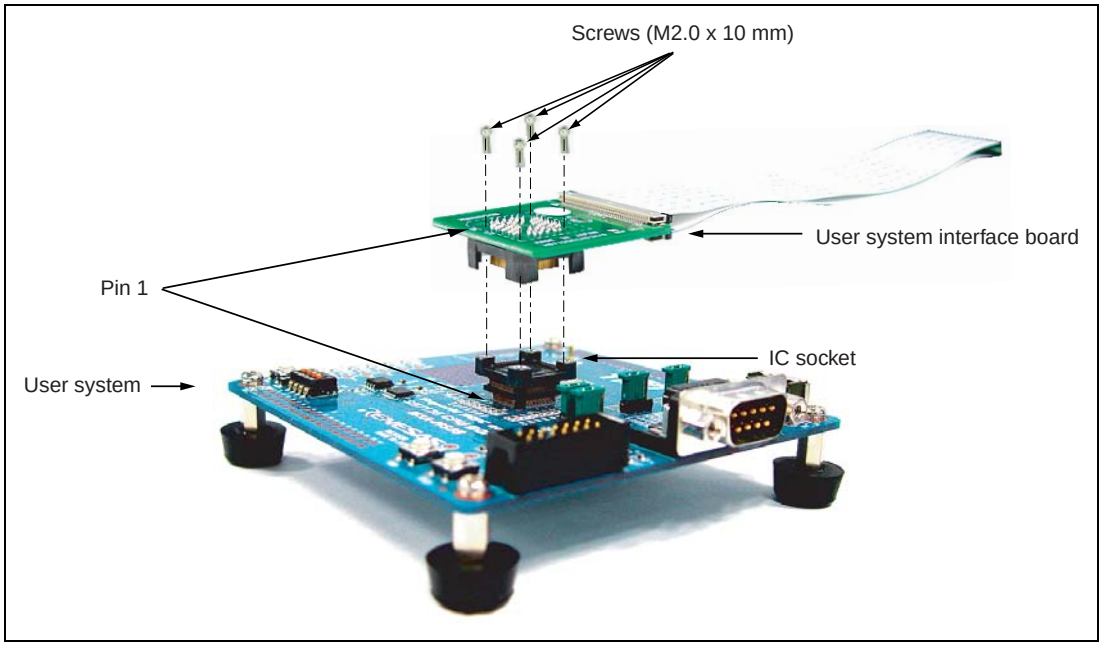


Figure 2.5 Connecting the User System Interface Board to the User System

2.2.3 Setting the Power-Selection Switch

This switch selects the external power supply (DC5V) or the PVCC power supply on the user system as the source of power for the debugging MCU board. Refer to table 2.1 when selecting the power supply to be used.

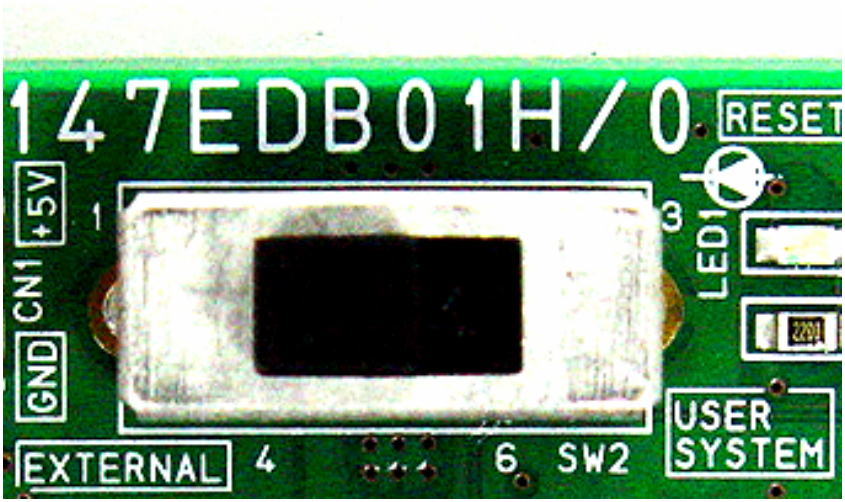


Figure 2.6 Power-Selection Switch

Table 2.1 Correspondence of Power-Selection Switch Settings

Silk-Screened Label	Power Supply to be Used
EXTERNAL	External power supply connected to the power cable (factory setting)
USER SYSTEM	PVCC on the user system

2.2.4 Connecting the Power Cable

When the power-selection switch is set to ‘EXTERNAL’, the power cable must be connected to the debugging MCU board so that power can be supplied from beyond the board. Connect the power cable to the power-cable connector on the debugging MCU board as shown in figure 2.7. Since the debugging MCU board operates with the PVCC power supply when the power-selection switch is set to be ‘USER SYSTEM’, the power cable needed not to be connected.

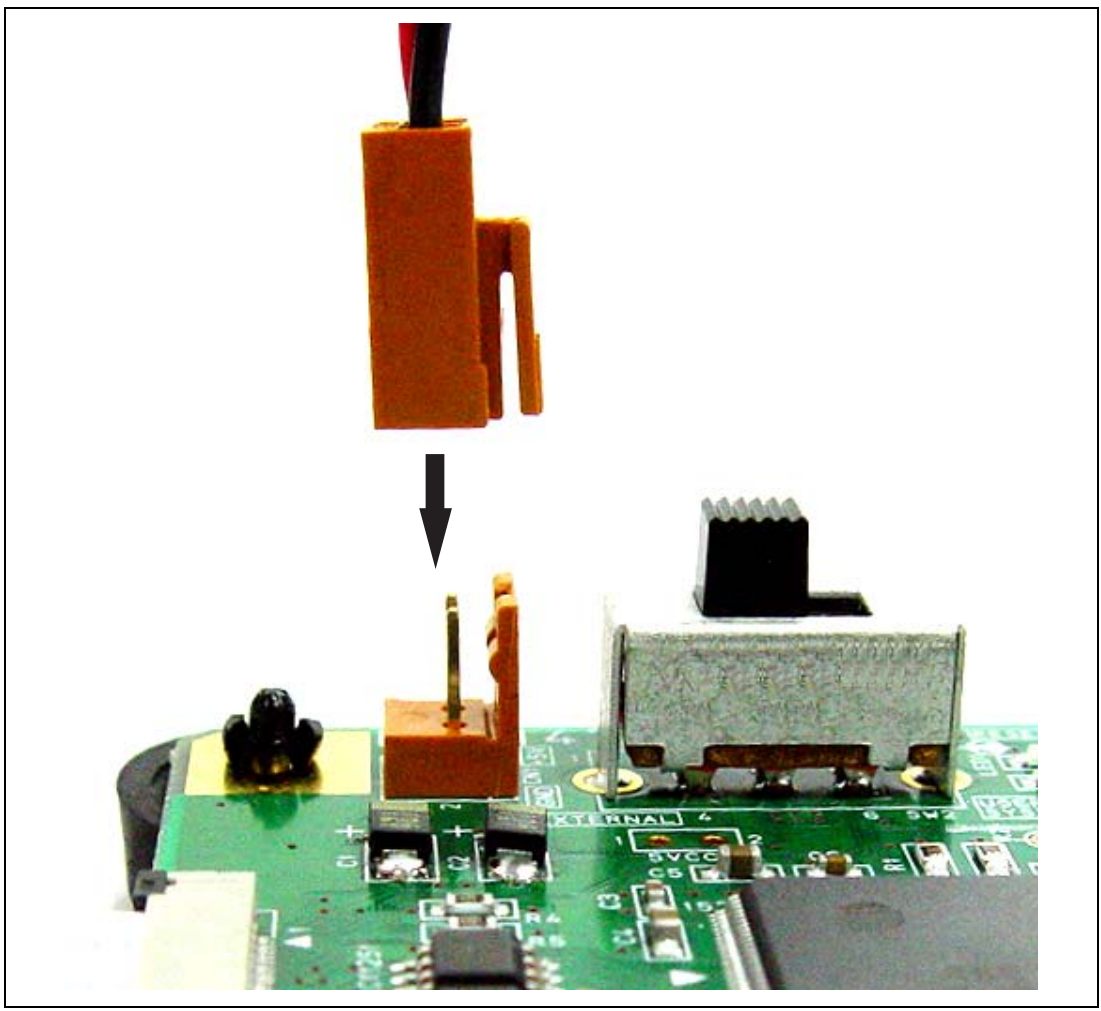


Figure 2.7 Connecting the Power Cable to the Debugging MCU Board

2.2.5 Setting the Clock-Selection Jumper

The EXTAL input from the user system or the crystal resonator installed on the debugging MCU board can be selected as the source of the clock signal for the MCU. Refer to table 2.2 when selecting the clock.

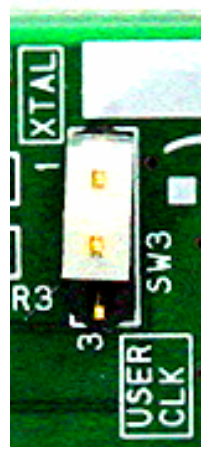


Figure 2.8 Clock-Selection Jumper

Table 2.2 Correspondence of Clock-Selection Jumper Settings

Silk-Screened Label	Jumper Pin (SW3)	Clock to be Used
XTAL	Pins 1-2 closed	Crystal resonator installed on the debugging MCU board
USER CLK	Pins 2-3 closed	EXTAL input from the user system (factory setting)

Note: 'XTAL' should only be selected if a crystal resonator has been mounted across the crystal-resonator installation sockets (X1) of the debugging MCU board. Users must provide the crystal resonator.

2.2.6 Installing a Crystal Resonator

'XTAL' should only be selected if a crystal resonator has been mounted on the debugging MCU board. Install the crystal resonator across the crystal-resonator installation sockets of the debugging MCU board.

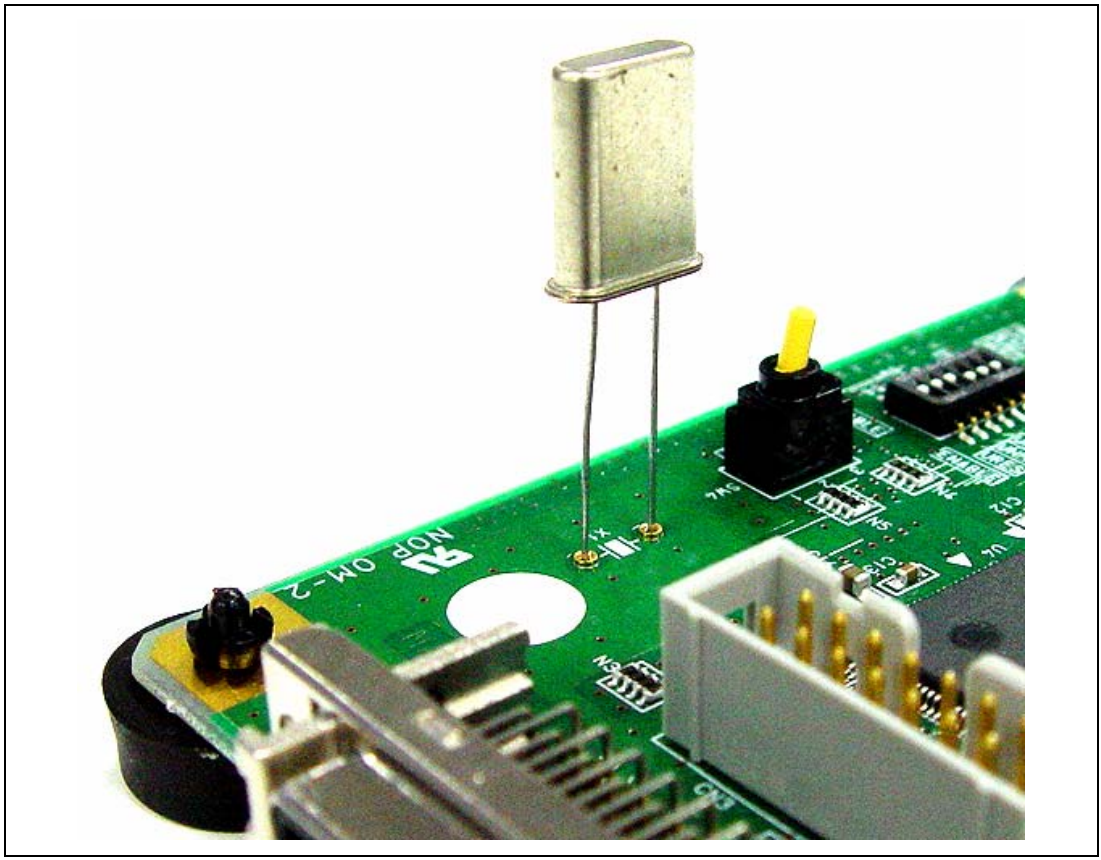


Figure 2.9 Installing a Crystal Resonator

2.2.7 Setting the User-System Input Signal Enabling/Disabling Switches

These switches enable or disable the input of the /RES, NMI, and MD signals from the user system to the debugging MCU board. The block also includes switches to set a desired level for each MD signal when input of the MD signal from the user system has been disabled. Table 2.3 lists the signals and settings.

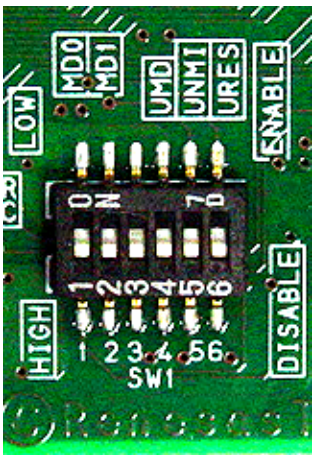


Figure 2.10 User-System Input Signal Enabling/Disabling Switches

Table 2.3 Correspondence of User-System Input Signal Enabling/Disabling Switch Settings

Silk-Screened Label	Number on SW1	High	Low
MD0	1	When input of the MD signals from the user system has been disabled, input the high level to MD0 (factory setting).	When input of the MD signals from the user system has been disabled, input the low level to MD0 low level to the MD0.
MD1	2	When input of the MD signals from the user system has been disabled, input the high level to MD1 (factory setting).	When input of the MD signals from the user system has been disabled, input the low level to MD1.
—	3	Do not change the position of this switch (factory setting).	Do not change the position of this switch.
Silk-Screened Label	**Number on SW1**	**DISABLE**	**ENABLE**
UMD	4	Disable input of the MD signals from the user system and use the MD0 and MD1 settings made on this switch block (SW1).	Enable input of the MD signals from the user system (factory setting).
UNMI	5	Fix the NMI input to the high level. (factory setting).	Enable input of the NMI signal from the user system (factory setting).
URES	6	Fix the /RES input to high level. (factory setting).	Enable input of the /RES signal from the user system (factory setting).

2.2.8 Connecting the System Ground

⚠ WARNING

Separate the frame ground and signal ground of the user system. Failure to do so will create a FIRE HAZARD that can damage the user system and emulator product, or produce PERSONAL INJURY.

The signal grounds of the E10A-USB emulator and the debugging MCU board are connected to the user system's signal ground. In the emulator, the signal ground and frame ground are connected. In the user system, only connect the frame ground to earth; do not connect the signal ground to the frame ground (figure 2.11).

If it is difficult to separate the frame ground from the signal ground in the user system, tie the frame ground of the user system to the same potential as the GND level of the DC power input (AC adapter) of the host computer. This is because differences in GND potential between the host computer and target system will lead to excessive flows of current in the low-impedance GND lines, and thin lines might burn out.

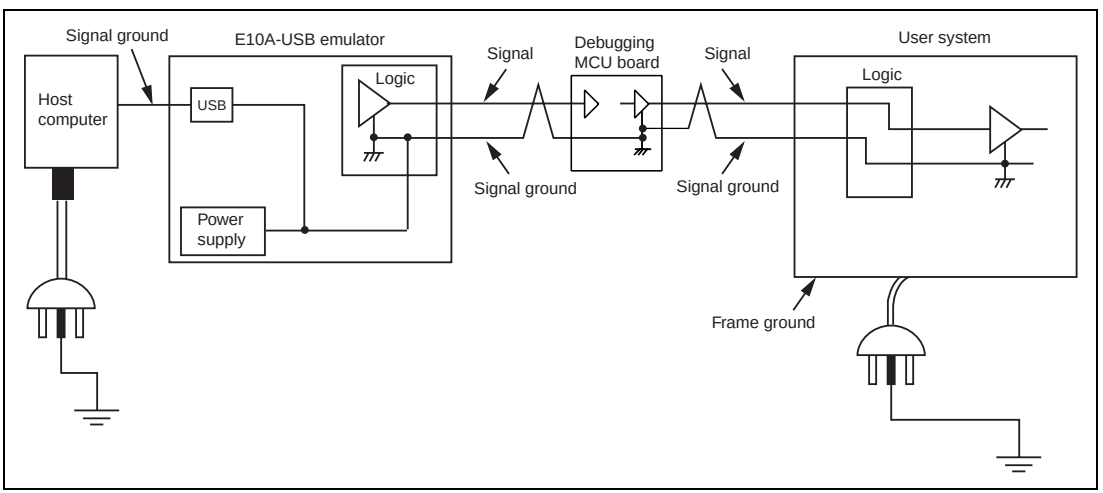


Figure 2.11 Connecting System Ground

2.3 Setting the E10A-USB Emulator

2.3.1 Setting the DIP Switches of the E10A-USB Emulator

Set the DIP switches of the E10A-USB emulator as follows.

1. Open the sliding switch cover in the lower right portion of the upper side of the E10A-USB emulator by sliding it to the right as shown in figure 2.12.
2. Turn all of the DIP switches (SW1, SW2, and SW3) on (‘1’ side).

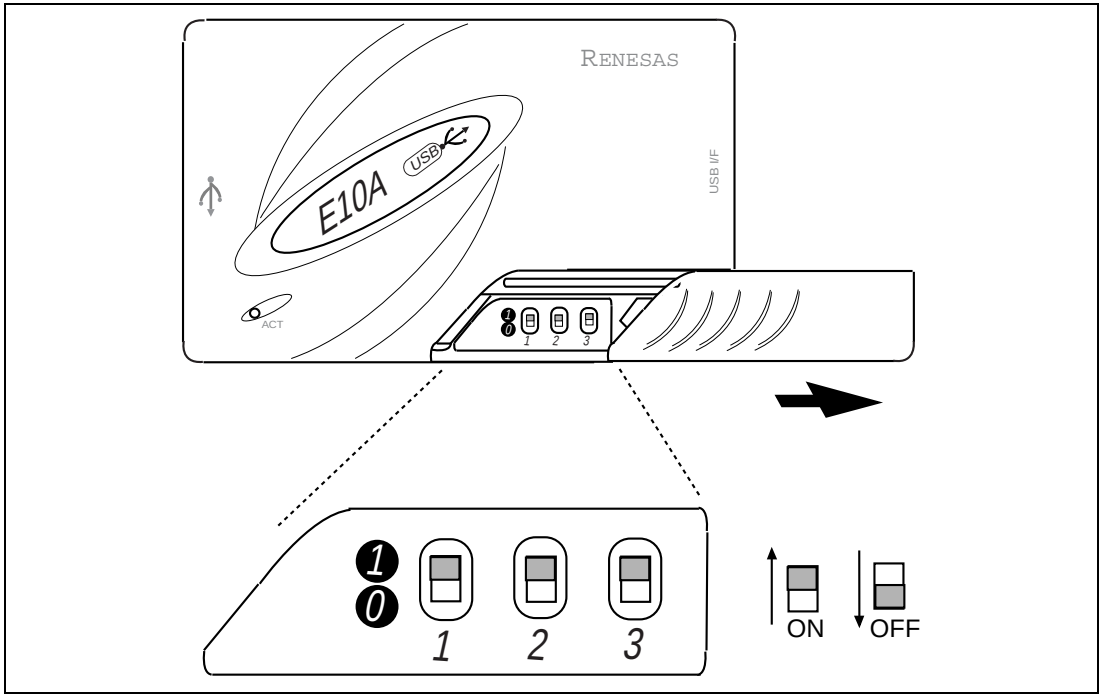


Figure 2.12 Setting the DIP Switches of the E10A-USB Emulator

2.3.2 CD-R

The emulator's software for the debugging MCU board is included in the CD-R provided with the E10A-USB emulator.

The root directory of the CD-R contains a setup program for installing the emulator's software for the debugging MCU board. The folders contain the files and programs listed below.

Table 2.4 Contents of the CD-R Directories

Directory Name	Contents	Description
Dlls	Microsoft® runtime library	A runtime library for the High-performance Embedded Workshop. The version is checked at installation and this library is copied to the hard disk as part of the installation process.
Drivers	E10A-USB emulator driver	USB drivers for the E10A-USB emulator.
Help	Online help for the E10A-USB emulator	An online help file. This is copied to the hard disk as part of the installation process.
Manual	E10A-USB emulator manuals	E10A-USB emulator user's manuals. They are provided as PDF files.

Execute HewInstMan.exe from the root directory of the CD-R to start the installation wizard.

Follow the cues given by the installation wizard to install the software. Select the SH-2 device group in the wizard for selecting the device group to be installed.

Note: When a driver is installed in Windows® XP, a warning message on the Windows® logo test may be displayed, but it is not a problem. Select [Continue Anyway] to proceed with driver installation.

2.3.3 Connecting the E10A-USB Emulator to the Host Computer

This section describes how to connect the E10A-USB emulator to the host computer. For the position of each connector of the emulator, refer to the SuperH™ Family E10A-USB Emulator User's Manual.

Notes: 1. When [Add New Hardware Wizard] is displayed, select the [Search for the best driver for your device. (Recommended)] radio button and then the [Specify a location] check box to select the path to be searched for drivers. The location must be specified as <Drive>:\DRIVERS. (<Drive> is the CD drive letter.)

2. When a driver is installed in Windows® XP, a warning message on the Windows® logo test may be displayed, but it is not a problem. Select [Continue Anyway] to proceed with driver installation.
3. Be sure to install the software for the E10A-USB emulator before putting the emulator in place.

⚠ WARNING

Always switch OFF the emulator product and the user system before connecting or disconnecting any CABLES except for the USB interface cable. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY.
The USER PROGRAM will be LOST.

The E10A-USB emulator is connected to the host computer via the USB 1.1, and also to the USB port conforming to USB 2.0. Figure 2.13 shows the system configuration.

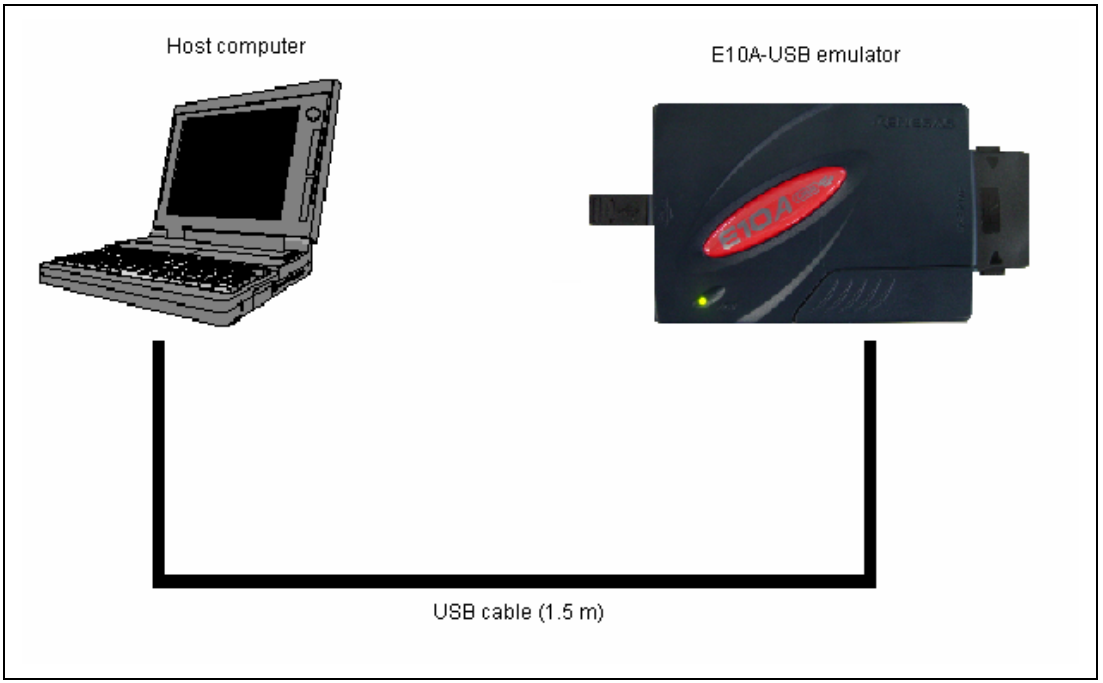


Figure 2.13 System Configuration when Connecting the E10A-USB Emulator to the Host Computer

2.3.4 Setting Up the E10A-USB Emulator

Set up the E10A-USB emulator's firmware referring to section 3.10, Setting Up the Emulator, and section 3.11, System Check, in the SuperH™ Family E10A-USB Emulator User's Manual.

2.3.5 Activating the High-performance Embedded Workshop

Activate the High-performance Embedded Workshop referring to section 4, Preparations for Debugging, in the SuperH™ Family E10A-USB Emulator User's Manual, which describes the activation procedure.

2.4 Setting Up the Debugging MCU Board for Single Operation

Since the debugging MCU board can be initiated even if the user system has not been connected, it is available for simple evaluation before designing the user system.

⚠ WARNING

1. **Always disconnect the E10A-USB emulator from the host computer and switch OFF the debugging MCU board before setting switches on the debugging MCU board. Failure to do so will create a FIRE HAZARD that can damage the E10A-USB emulator product, the debugging MCU board, or the user system interface board.**
2. **For the single operation of the debugging MCU board, connector pins on the bottom of the user system interface board, which are used for connecting the user system, are disconnected. To prevent connector pins from being shorted, be sure to put an insulator under the user system interface board.**

2.4.1 Setting Switches on the Debugging MCU Board

For the single operation of the debugging MCU board, set the switches on the debugging MCU board as described below and activate the High-performance Embedded Workshop.

1. Only the external power supply is supported. Set the power-selection switch to 'EXTERNAL' and supply the external power (DC5V) from the power-cable connector.
2. Only the crystal resonator installed on the debugging MCU board is supported as the source of the clock signal.
   Set the clock-selection jumper to 'XTAL' to install the crystal resonator across the crystal-resonator installation sockets.
3. If the debugging MCU board is to operate in stand-alone mode, the user-system input signal enabling/disabling switch block must be set on the debugging MCU board. Set switches UMD, URES, and UNMI to the 'DISABLE' position and set switches MD0 and MD1 to the levels which correspond to the desired MCU mode.

2.4.2 Inputting Reset Signals to the Debugging MCU Board

When reset signals must be input, such as the case when activating the High-performance Embedded Workshop or debugging, they can be manually input from the reset switch on the debugging MCU board. For details on inputting reset signals, see table 2.5.

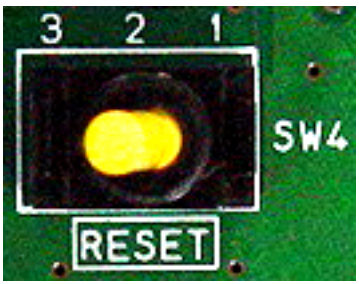


Figure 2.14 Reset Switch

Table 2.5 Correspondence of Reset Switch Settings

Setting of SW4	Reset Signal Input to the Debugging MCU Board
Turned to '3' of silk-screened label	Reset signal input from the reset switch is canceled. (factory setting)
Turned to '1' of silk-screened label	Reset signal is input from the reset switch.

Note: This reset switch is used to manually input reset signals to the debugging MCU board. When the user system is connected, this reset switch is also available for inputting reset signals to the debugging MCU board, however, note that no reset signal is output to the user system.

Section 3 Hardware Specifications

3.1 External Dimensions of the Debugging MCU Board

Figures 3.1 through 3.3 show the external dimensions of the debugging MCU board.

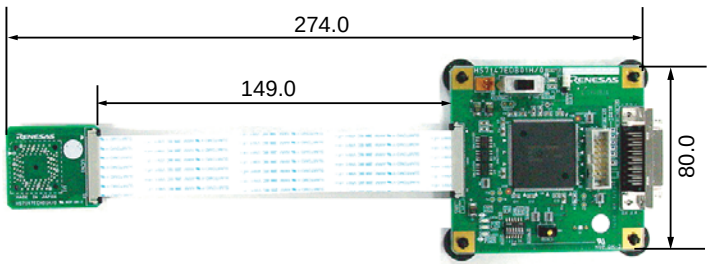


Figure 3.1 External Dimensions of the Debugging MCU Board

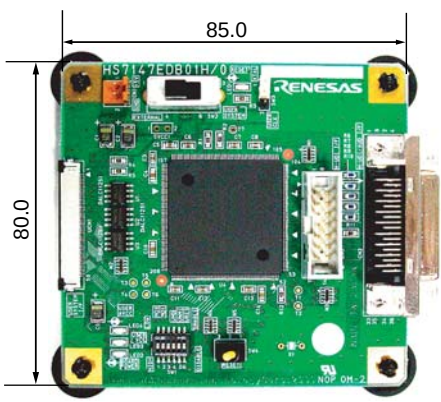


Figure 3.2 External Dimensions of the Main Unit of the Debugging MCU Board

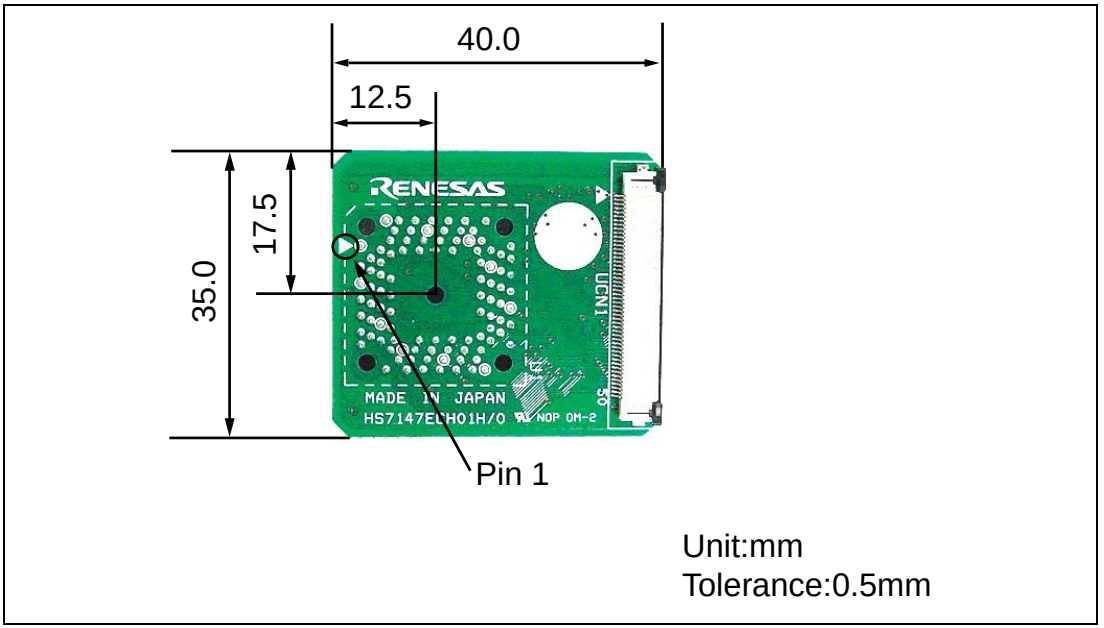


Figure 3.3 External Dimensions of the User System Interface Board

3.2 Resulting Dimensions after Connecting User System Interface Board

Figure 3.4 shows the resulting dimensions, after connecting the user system interface board to the user system.

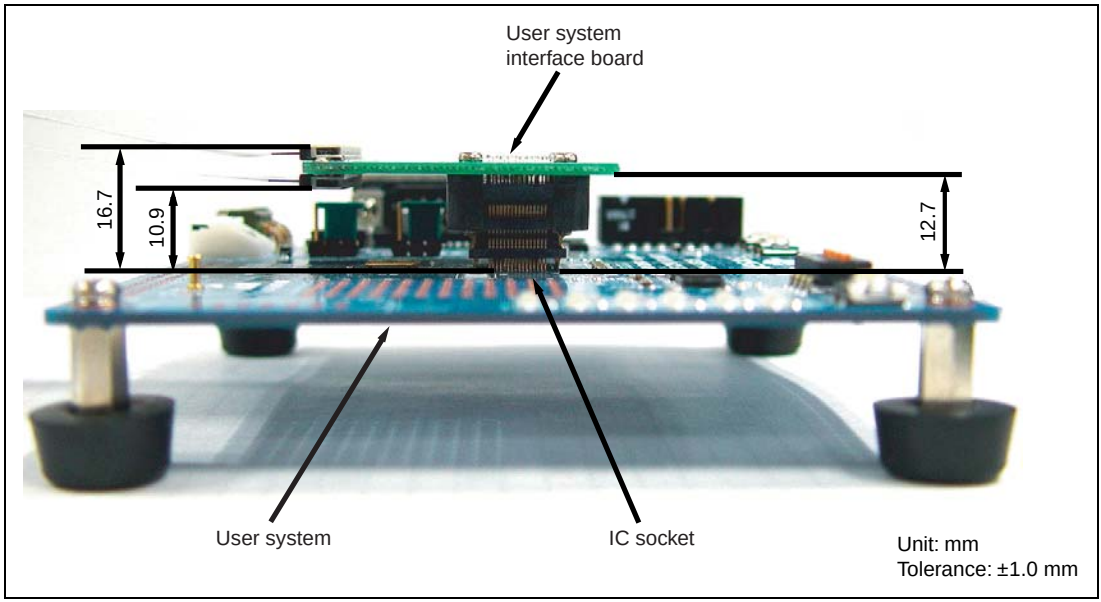
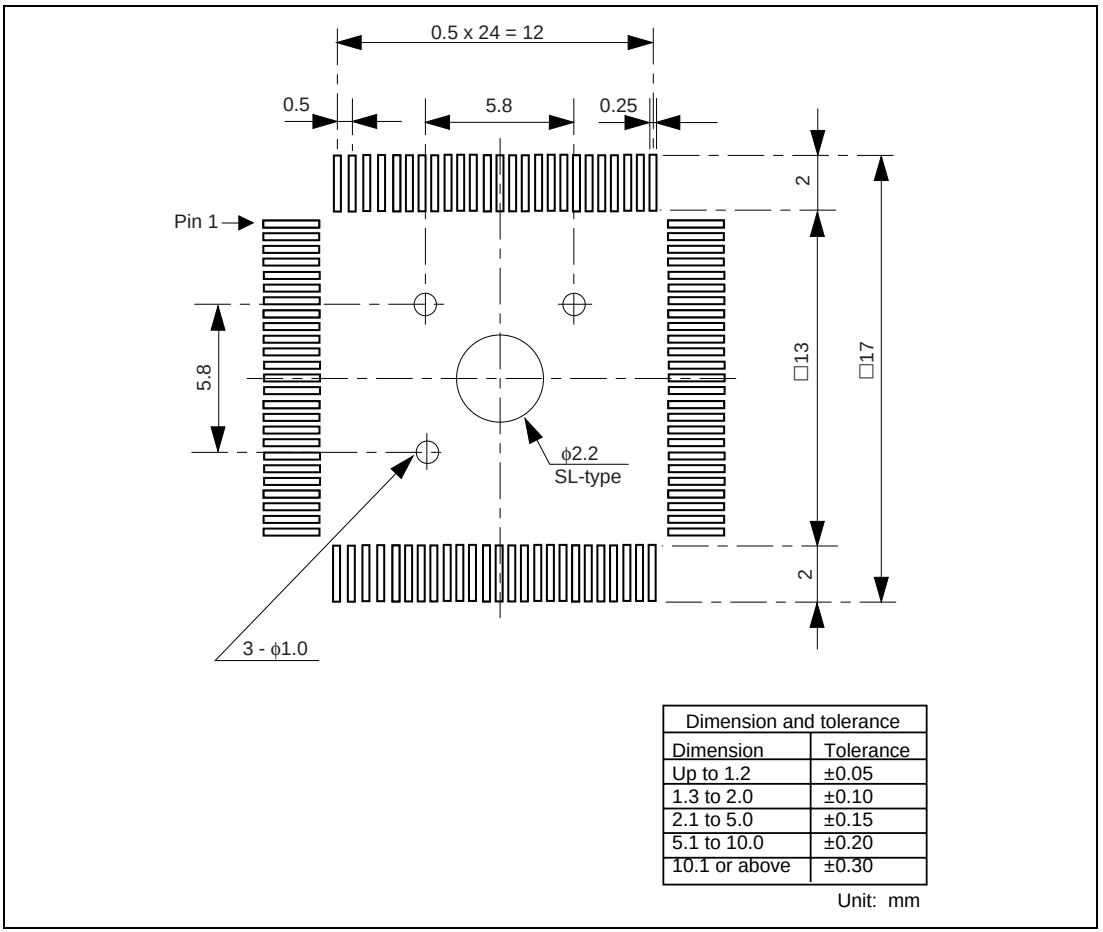


Figure 3.4 Resulting Dimensions after Connecting User System Interface Board

3.3 Recommended Dimensions for User System Mount Pad (Footprint)

Figure 3.5 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a PLQP0100KB-A (former code: FP-100UV) package (NQPACK100SD-ND: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 3.5 are somewhat different from those of the actual chip's mount pad.



Dimension and tolerance	
Dimension	Tolerance
Up to 1.2	±0.05
1.3 to 2.0	±0.10
2.1 to 5.0	±0.15
5.1 to 10.0	±0.20
10.1 or above	±0.30

Unit: mm

Figure 3.5 Recommended Dimensions for Mount Pad for PLQP0100KB-A (Former Code: FP-100UV)

3.4 Installing the MCU to the User System

CAUTION

1. **Check the location of pin 1 before inserting.**
2. **Use a Philips-type screwdriver whose head matches the screw head.**
3. **The tightening torque must be 0.054 N•m or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.**
4. **If the MCU does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

Check the location of pin 1 before inserting the MCU into the IC socket on the user system, as shown in figure 3.6. After inserting the MCU, fasten the socket cover with the provided four screws (M2.0 x 6 mm). Take special care, such as manually securing the IC socket soldered area, to prevent the IC socket from being damaged by overtightening the screws or twisting the components.

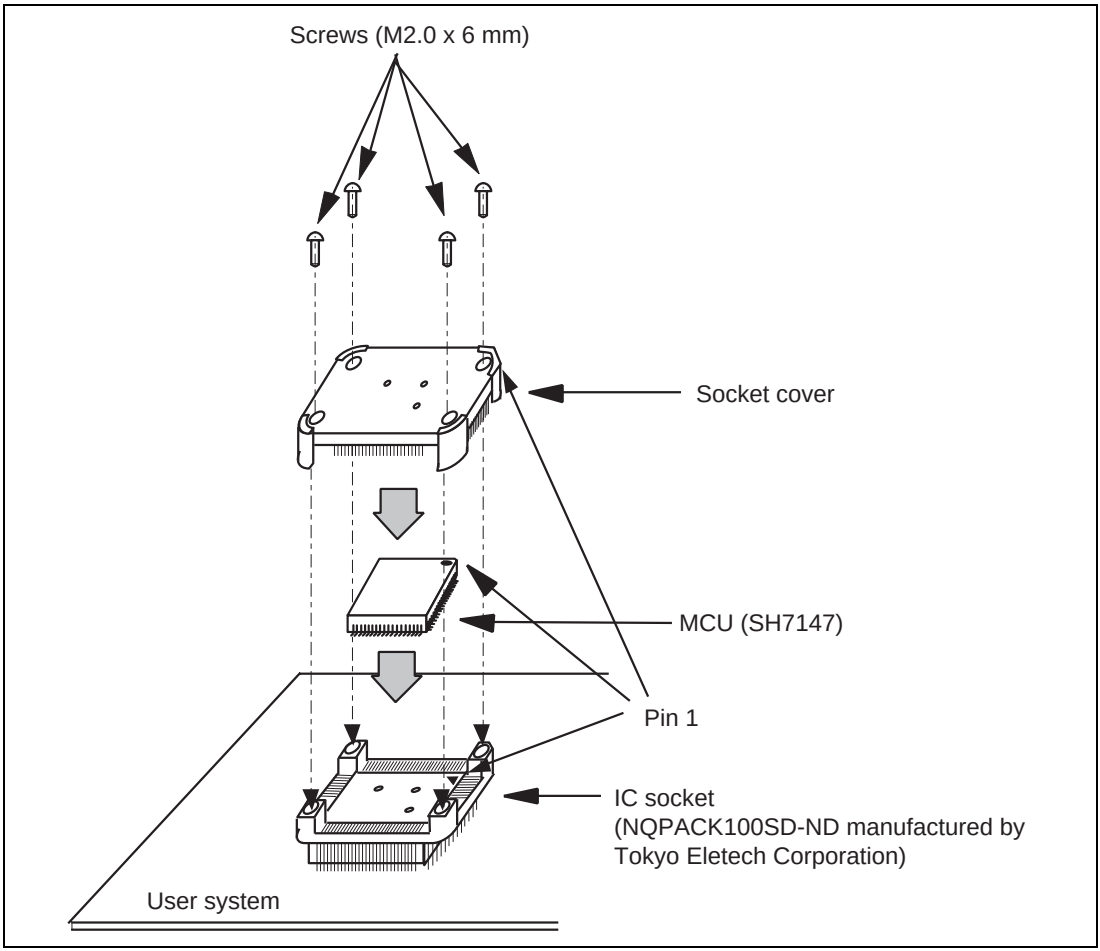


Figure 3.6 Installing MCU to User System

3.5 User System Interface Circuits

Figures 3.7 through 3.12 show user system interface circuits. Use them as a reference to determine the value of the pull-up resistance.

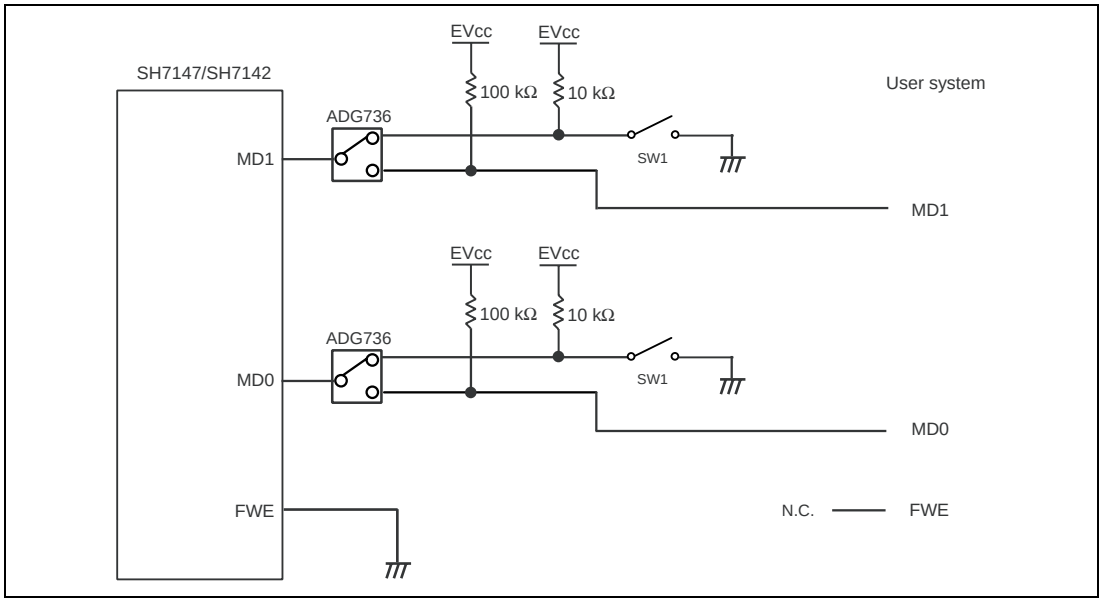


Figure 3.7 User System Interface Circuits

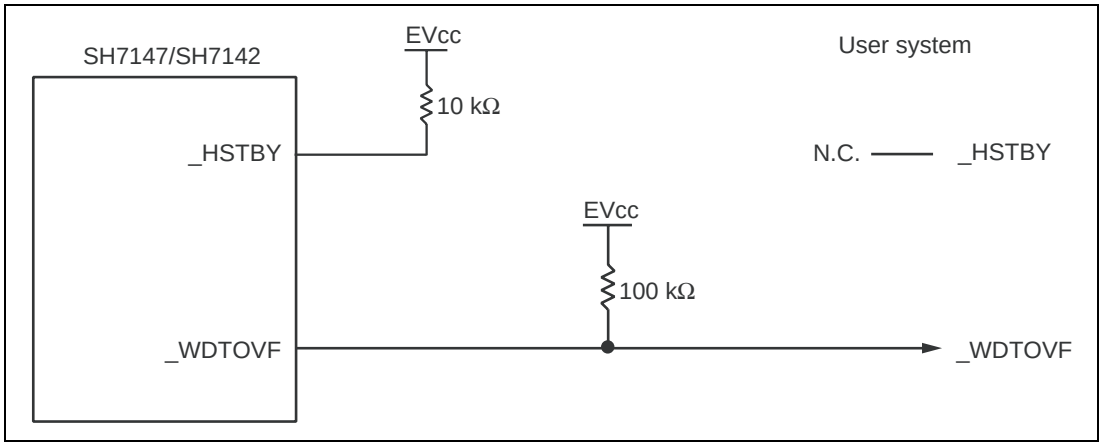


Figure 3.8 User System Interface Circuits

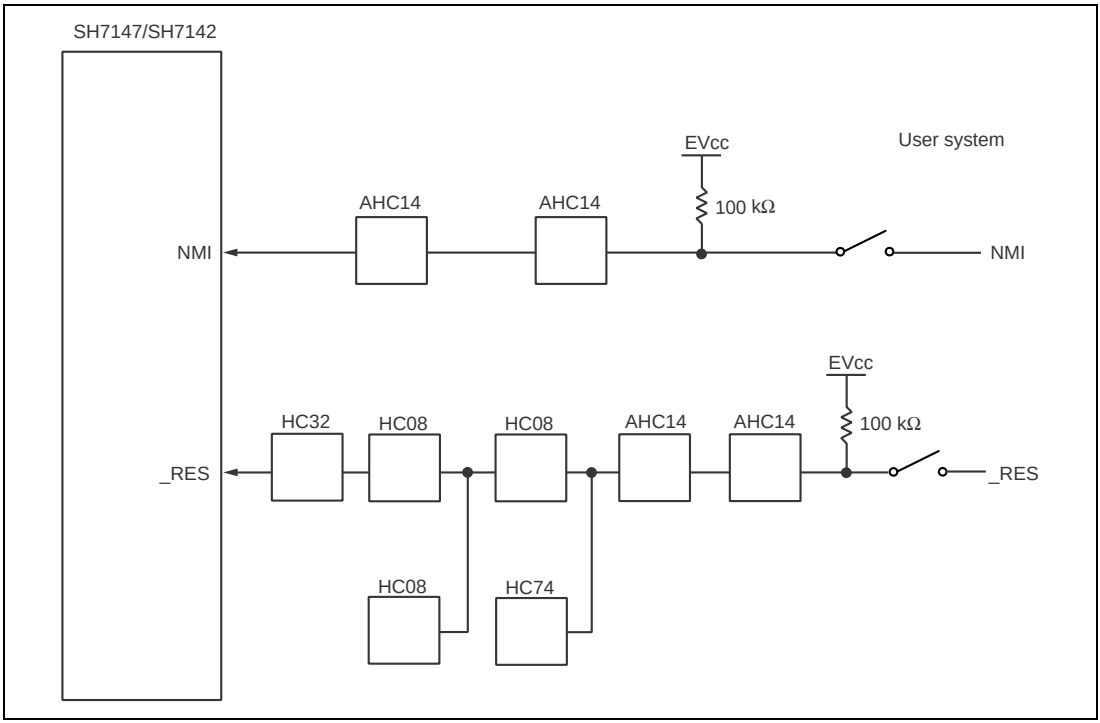


Figure 3.9 User System Interface Circuits

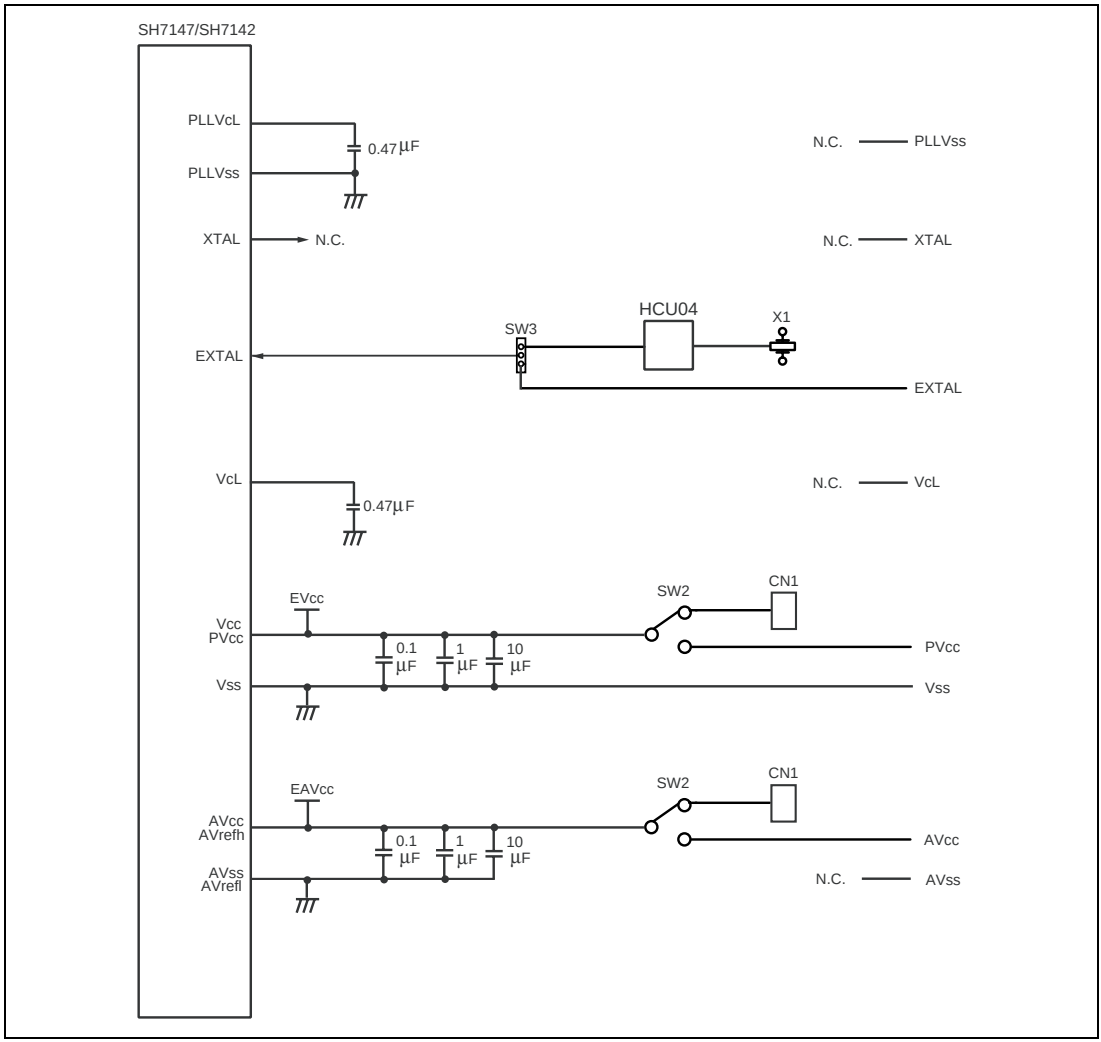


Figure 3.10 User System Interface Circuits

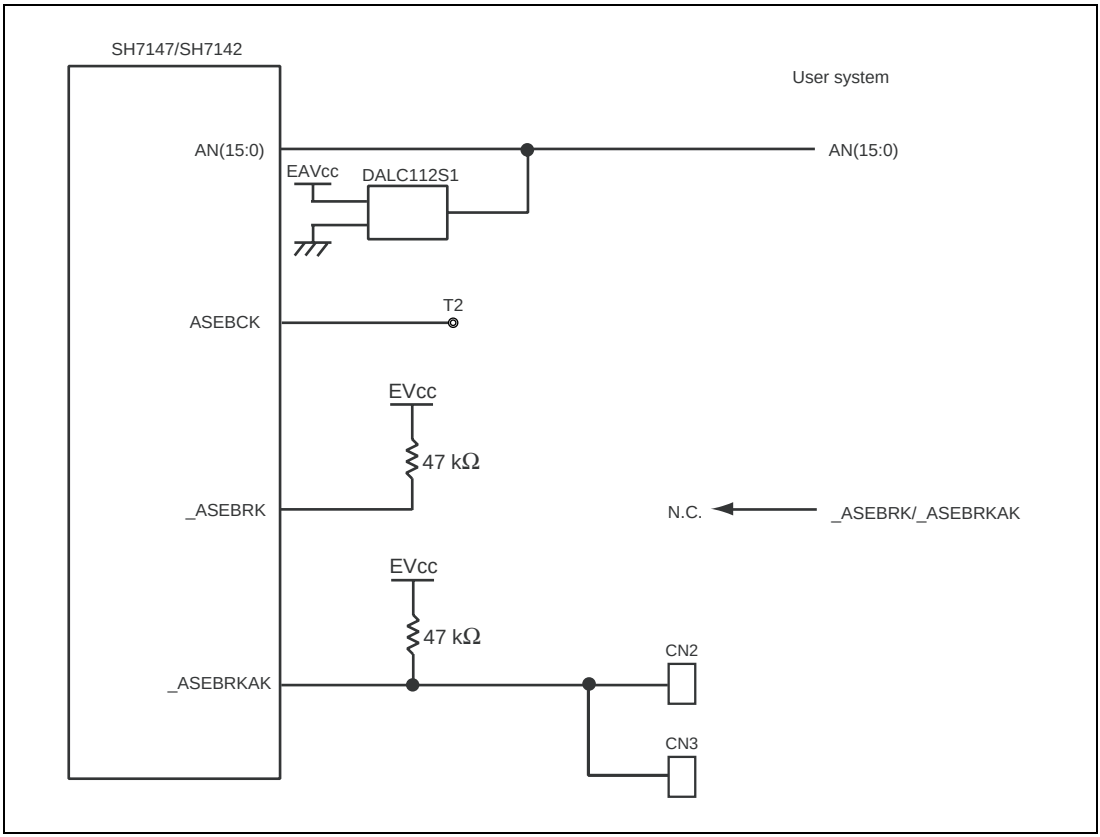


Figure 3.11 User System Interface Circuits

Figure 3.12 User System Interface Circuits

3.6 Delay Time for the User System Interface

Since the _RES and NMI signals are connected to the user system via the logic on the EV-chip unit, a delay time shown in table 3.1 will be generated until the signal is input from the user system to the MCU.

Table 3.1 Delay Time for Signals via the EV-chip Unit

No.	Signal Name	Delay Time (ns)
1	_RES	20
2	NMI	10

Section 4 Maintenance and Guarantee

This section describes maintenance, guarantee, repair provisions, and how to request for repair of the emulator.

4.1 User Registration

When you purchase our product, be sure to register as a user. For user registration, refer to the section of ‘User Registration’ (p. i) of this user's manual.

4.2 Maintenance

1. If dust or dirt collects on any equipment of this product, wipe the board dry with a soft cloth. Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.
2. When you do not use this product for a long period, for safety purposes, disconnect the power cable from the power supply.

4.3 Guarantee

If your product becomes faulty within one year after its purchase while being used under good conditions by observing ‘IMPORTANT INFORMATION’ described in this user's manual, we will repair or replace your faulty product free of charge. Note, however, that if your product's fault is raised by any one of the following causes, we will repair it or replace it with new one with extra-charge:

- Misuse, abuse, or use under extraordinary conditions
- Unauthorized repair, remodeling, maintenance, and so on
- Inadequate user's system or misuse of it
- Fires, earthquakes, and other unexpected disasters

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

4.4 Repair Provisions

4.4.1 Repair with Extra-Charge

The products elapsed more than one year after purchase can be repaired with extra-charge.

4.4.2 Replacement with Extra-Charge

If your product's fault falls in any of the following categories, the fault will be corrected by replacing the entire product instead of repair, or you will be advised to purchase new one, depending on the severity of the fault.

- Faulty or broken mechanical parts
- Flaw, separation, or rust in coated or plated parts
- Flaw or cracks in plastic parts
- Faults or breakage caused by improper use or unauthorized repair or modification
- Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply
- Cracks in the printed circuit board or burnt-down patterns
- Wide range of faults that makes replacement less expensive than repair
- Unlocatable or unidentified faults

4.4.3 Expiration of the Repair Period

When a period of one year elapses after the model was dropped from production, repairing products of the model may become impossible.

4.4.4 Transportation Fees at Sending Your Product for Repair

Send your product to us for repair at your expense.

4.5 How to Make a Request for Repair

If your product is found faulty, follow the procedure below to send your product for repair.

Fill in the Repair Request Sheet included with this product, then send it along with this product for repair to your local distributor. Make sure that information in the Repair Request Sheet is written in as much detail as possible to facilitate repair.

⚠ CAUTION

Note on Transporting the Product:

When sending your product for repair, use the packing box and cushion material supplied with this product when delivered to you and specify handling caution for it to be handled as precision equipment. If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with this product (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

Appendix A Repair Request Sheet

Thank you for purchasing the SH7147 group debugging MCU board (HS7147EDB01H).

In the event of a malfunction, fill in the repair request sheet on the following pages and send it to your distributor.

Repair Request Sheet

To Distributor

Your company name:

Person in charge:

Tel.:

Item	Symptom
1. Date and time when the malfunction occurred	Month/Day/Year {at system initiation, in system operation} *Circle either of items in the braces { }.
2. Frequency of generation of the malfunction	( ) times in ( ) {day(s), week(s), or month(s)} *Enter the appropriate numbers in the parentheses ( ) and circle one of the three items in the braces { }.
3. System configuration when the malfunction occurred	Enter the system configuration in use when the malfunction occurred. • E10A-USB emulator (HS0005KCU01H or HS0005KCU02H): Serial No.: Revision: The above items are written on the label for product management at the bottom of the emulator unit; the serial no. is the five-digit number and the revision is the string of letters following the number. • Provided CD-R (HS0005KCU01SR): Version: V. Shown as 'V.x.xx release' on the CD-R (x: numeral). • SH7147 group debugging MCU board (HS7147EDB01H): Serial No.: Revision: These are impressed on the circuit board. • Host computer in use: Manufacturer: Type number: OS:

Item	Symptom
4. Settings when the malfunction occurred	Enter the operational settings of the debugging MCU board. (1) Power-selection switch: EXTERNAL or USER SYSTEM (circle either item). (2) Clock-selection jumper: XTAL or USER CLK (circle either item). Input clock: MHz (3) User-system input signal enabling/disabling switches: UNMI: ENABLE or DISABLE (circle either item). URES: ENABLE or DISABLE (circle either item). UCON: ENABLE or DISABLE (circle either item). (4) Operating frequency: MHz
5. Failure phenomenon	
6. Error in debugging	
7. The High-performance Embedded Workshop does not link-up with the debugging MCU board.	Content of the error message

For errors other than the above, fill in the box below.

SH7147 Group Debugging MCU Board
HS7147EDB01H User's Manual

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HS7147EDB01H User's Manual

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